

INFORMATION DISCLOSURE STATEMENT

Applicant	: Satta et al.
App. No.	: Unknown
Filed	: Herewith
For	: METHOD FOR BOTTOMLESS DEPOSITION OF BARRIER LAYERS IN INTEGRATED CIRCUIT METALLIZATION SCHEMES
Examiner	: Unknown
Group Art Unit	: Unknown

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Enclosed is form PTO-1449 listing 69 references that are of record in U.S. patent application No. 10/123,492, filed April 15, 2002, which is the parent of this Continuation application, and is relied upon for an earlier filing date under 35 U.S.C. § 120. Copies of the references are not submitted pursuant to 37 C.F.R. § 1.98(d).

This Information Disclosure Statement is being filed with an RCE or within three months of the filing date of this application and no fee is required in accordance with 37 C.F.R. § 1.97(b)(1), (b)(2), or (b)(4).

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: December 8, 2003

By: 

Andrew N. Merickel
Registration No. 53,317
Attorney of Record
Customer No. 20,995
(415) 954-4114

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (USE SEVERAL SHEETS IF NECESSARY)	ATTY. DOCKET NO. IMEC182.001C1C1	APPLICATION NO. Unknown
	APPLICANT Satta et al.	
	FILING DATE Herewith	GROUP Unknown

U.S. PATENT DOCUMENTS							
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE (IF APPROPRIATE)
	1.	4,058,430	11/15/77	Suntola et al.			
	2.	4,413,022	11/1/83	Suntola et al.			
	3.	4,747,367	5/31/88	Posa			
	4.	4,761,269	8/2/88	Conger et al.			
	5.	5,674,781	10/7/97	Huang et al.	437	192	2/28/96
	6.	5,711,811	1/27/98	Suntola et al.			
	7.	5,879,459	3/9/99	Gadgil et al.			
	8.	5,904,565	5/18/99	Nguyen et al.			
	9.	5,916,365	6/29/99	Sherman			
	10.	5,933,761	8/3/99	Lee	438	783	7/10/98
	11.	6,048,790	4/01/00	Lacoponi et al.	438	643	7/10/98
	12.	6,077,775	6/20/00	Stumborg et al.			
	13.	6,083,818	7/4/00	Stumborg et al.			
	14.	6,093,683	7/25/00	Cho et al.	438	627	12/10/98
	15.	6,100,184	8/8/99	Zhao et al.			
	16.	6,139,700	10/31/00	Kang et al.	204	192.17	9/30/98
	17.	6,184,128 B1	2/6/01	Wang et al.			
	16.	6,188,134 B1	2/13/01	Stumborg et al.	257	751	8/20/98
	19.	6,200,839 B1	3/13/01	Batra et al.			
	20.	6,200,893	03/2001	Sneh			
	21.	6,200,893 B1	3/13/01	Wang et al.	438	685	3/13/01
	22.	6,203,613 B1	3/20/01	Gates et al.			
	23.	6,207,567 B1	3/27/01	Wang et al.	438	685	4/12/99
	24.	6,225,213 B1	5/1/01	Urabe	438	627	1/22/98
	25.	6,270,572 B1	8/7/01	Kim et al.			
	26.	6,287,965	9/11/01	Yokoyama et al.	438	624	4/23/98
	27.	6,358,829	3/19/02	Yoon et al.			9/16/99

EXAMINER	DATE CONSIDERED
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U.S. PATENT DOCUMENTS							
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE (IF APPROPRIATE)
	28.	6,368,954	4/9/02	Lopatin et al.	438	627	7/28/00
	29.	6,391,785	05/2000	Satta et al.			
	30.	2001034123 (US published application 2001)	10/25/01	Jeon et al.	438	643	4/6/01

FOREIGN PATENT DOCUMENTS								
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	31.	DE 196 27 017 A1	1/9/97	Germany				
	32.	DE 198 20 147 A1	1/7/99	Germany				
	33.	KR 2000054970	2/2/99	Korea				
	34.	WO 96/17107	6/6/96	PCT				
	35.	WO 99/41423	8/19/99	PCT				

EXAMINER INITIAL	OTHER DOCUMENTS (INCLUDING AUTHOR, TITLE, DATE, PERTINENT PAGES, ETC.)
	36. Abeles et al., "Amorphous Semiconductor Superlattices," <u>Physical Review Letters</u> , November 1983, Vol. 51, No. 21, pp. 2003-2006.
	37. Bedair, S.M., "Selective-area and sidewall growth by atomic layer epitaxy," <u>Semicond. Sci. Technol.</u> , Vol. 8, (1993), pp. 1052-1062.
	38. Döscö et al., Research Institute for Materials Science – ATKI, H-1525 Budapest, Hungary; Utriainen et al., Laboratory of Inorganic and Analytical Chemistry, Helsinki University of Technology, FIN-02150 Espoo, Finland, "Deposition of Tin Oxide into Porous Silicon by Atomic Layer Epitaxy," <u>J. Electrochem. Soc.</u> , February 1996, Vol. 143, No. 2, pp. 683-687.
	39. Fazan et al., "A High-C Capacitor (20.4 fF/μm ²) with Ultrathin CVD – Ta ₂ O ₅ Films Deposited on Rugged Poly-Si for High Density DRAMs," <u>IEEE</u> , 1992, pp. IDEM 92-263-IDEM 92-266.
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	42. Horike et al., "Filling of Si oxide into a deep trench using digital CVD method," <u>Applied Surface Science</u> , 1990, Vol. 46, pp. 168-174.
	43. Kaizuka et al., "Conformal Chemical Vapor Deposition TiN (111) Film Formation as an Underlayer of Al for Highly Reliable Interconnects," <u>Jpn. J. Appl. Phys.</u> , 1994, Vol. 33, pp. 470-474.
	44. Kikkawa et al., "A Quarter-Micrometer Interconnection Technology Using a TiN/Al-Si-Cu/TiN/Al-Si-Cu/TiN/Ti Multilayer Structure," <u>IEEE Transaction on Electron Devices</u> , February 1993, Vol. 40, No. 2, pp. 296-302.
	45. Kikkawa et al., "Al-Si-Cu/TiN multilayer interconnection and Al-Ge reflow sputtering technologies for quarter-micron devices," <u>SPIE</u> , 1992, Vol. 1805, pp. 54-64.
	46. Kim et al., "Applicability of ALE TiN films as Cu/Si diffusion barriers" <u>Thin Solid Films</u> 372(1):276-283 (2000)
	47. Kim et al., "Comparison of TiN and TiAlN as a Diffusion Barrier Deposited by Atomic Layer Deposition" <u>Journal of the Korean Physical Society</u> , 40(1), 176-179 (2002)
	48. Klaus et al., "Atomic Layer Deposition of SiO ₂ Using Catalyzed and Uncatalyzed Self-Limiting Surface Reactions," <u>Surface Review and Letters</u> , Vol. 6, Nos. 3 & 4 (1999) pp. 435-448.

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EXAMINER INITIAL	OTHER DOCUMENTS (INCLUDING AUTHOR, TITLE, DATE, PERTINENT PAGES, ETC.)	
	49.	Klaus et al., "Atomic Layer Deposition of Tungsten Nitride Films Using Sequential Surface Reactions" <u>J. Electrochem Soc.</u> 147(3): 1175-1181 (2000)
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	51.	Koo et al., "Study on the characteristics of TiAlN thin film deposited by atomic layer deposition method" <u>Journal of Vacuum Science & Technology, A: Vacuum Surfaces, and Films</u> 19(6), 2931-2834 (2001)
	52.	Kukli et al., "Atomic Layer Epitaxy Growth of Tantalum Oxide Thin Films from Ta(OC ₂ H ₅) ₅ and H ₂ O," <u>J. Electrochem. Soc.</u> , May 1995, Vol. 142, No. 5, pp. 1670-1674.
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	54.	Martensson et al., "Atomic Layer Epitaxy of Copper on Tantalum," <u>Chemical Vapor Deposition</u> , Vol. 3, No. 1, pp. 45-50 (1997).
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	57.	Min et al., "Atomic Layer Deposition of TiN Films by Alternate Supply of Tetrakis (ethylmethylamino)-Titanium and Ammonia," <u>Japanese Journal of Applied Physics</u> , 1998, Vol. 37, pp. 4999-5004.
	58.	Min et al., "Atomic Layer Deposition of TiN Films by Sequential Introduction of Ti Precursor and NH ₃ ," <u>Materials Research Society</u> , 1998, Vol. 514, pp. 337-343
	59.	Min et al., "Chemical Vapor Deposition of Ti-Si-N Films with Alternating Source Supply," <u>Mat. Res. Soc. Symp. Proc.</u> , 1999 Materials Research Society, Vol. 564, pp. 207-210.
	60.	Min et al., "Metal-organic atomic-layer deposition of titanium-silicon-nitride films," <u>Applied Physics Letters</u> , Vol. 75, No. 11 pp. 1532-1523 (1999).
	61.	Niinistö et al., "Synthesis of oxide thin films and overlayers by atomic layer epitaxy for advanced applications," <u>Materials Science and Engineering</u> , 1996, Vol. B41, pp. 23-29.
	62.	Ritala et al., "Atomic Layer Epitaxy Growth of TiN Thin Films from TiI ₄ and NH ₃ ," <u>J. Electrochem. Soc.</u> , August 1998, Vol. 145, No. 8, pp. 2914-2920.
	63.	Ritala et al., "Controlled Growth of TaN, Ta ₃ N ₅ , and TaO _x N _y Thin Films by Atomic Layer Deposition," <u>Chem. Mater.</u> , 1999, Vol. 11, pp. 1712-1718.
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	67.	Sneh et al., "Atomic layer growth of SiO ₂ on Si (100) using SiCl ₄ and H ₂ O in a binary reaction sequence," <u>Surface Science</u> , 1995, Vol. 334, pp. 135-152.
	68.	Solanki et al., "Atomic Layer Deposition of Copper Seed Layers" <u>Electrochem. and Solid State Lett.</u> 3(10): 479-480 (2000)
	69.	Wise et al., "Diethyldiethoxysilane as a New Precursor for SiO ₂ Growth on Silicon," <u>Mat. Res. Soc. Symp. Proc.</u> , 1994, Vol. 334, pp. 37-43.

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